

## BOOK REVIEWS

**NUMERICAL METHODS FOR SHALLOW WATER FLOW** by C. B. Vreugdenhill, Water Science and Technology Library, Volume 13, Kluwer Academic Publishers, Dordrecht, 1994. No. of pages: 261. Price: £78.00. ISBN 0-7923-3164-8.

Fluvial geomorphologists made some use of one-dimensional models of flood routing and sediment transport during the 1960s and 1970s. The 1980s saw the advent of distributed approaches to modelling in areas such as hillslope hydrology, but it is only now that fluvial geomorphologists are beginning to recognize the benefits of two- and three-dimensional treatments of river channel flow and sediment transport problems, with an increasing use of computational fluid dynamics (CFD) packages. Such packages have been developed largely by civil engineers, and as a precursor to effective use, it is critical that geomorphologists familiarize themselves with the assumptions, and therefore the limitations, behind the models that they are using. Without such knowledge, their ability to use such methods will continually be questioned, and the application of these models to natural channels will escape the domain of the geomorphologist, becoming firmly entrenched in the civil engineering community. As a PhD student in a Geography Department, but making extensive use of numerical models of shallow-water flow, I realized how difficult it was to get that knowledge. It was virtually impossible to find a text that was accessible and which dealt explicitly with the special type of boundary layer flows in which I was interested. I was therefore forced to synthesize material from a large number of different texts, an activity that took considerable time.

This book would have made the job much easier. It is a succinctly written volume aimed at engineers, developers of CFD code, and mathematicians who require insight into the problems for which they are developing solutions. The emphasis is on engineering applications in rivers, estuaries

and coastal seas – areas that have traditionally been the domain of the geomorphologist. Although the author claims to assume a basic knowledge of fluid mechanics and CFD, any fluvial geomorphologist with a reasonably mathematical ability and a willingness to persevere should find the text accessible. The book begins with a general introduction to the types of shallow-water flows which are commonly encountered. Chapter 2 provides the basic theories on which the shallow-water flow equations are based, and this should be basic minimum reading for anyone using CFD software in geomorphology. Chapter 5 (dealing with boundary conditions), Chapter 6 (dealing with spatial discretization) and Chapter 8 (dealing with model solution) are also particularly useful. The remaining chapters focus more on the properties and behaviour of the equations, and are likely to be of less relevance to the geomorphologist. For those geomorphologists about to jump into the vacuum of research into using three-dimensional models, Chapter 9 tells a cautionary tale.

It would be too much to expect a book like this to engage with the geomorphological literature. For instance, it does not consider the way in which different river channel boundary conditions interact to control the nature and dimensionality of particular flows, and hence which assumptions can and cannot be made in choosing the most suitable model to use. A text that links CFD explicitly with fluvial geomorphology is still needed. However, this criticism is unfair, both because of the intended readership of the book, and because selectively dipping into the book will go some way to providing the basic minimum knowledge that any geomorphologist should have if they are hoping to engage in numerical modelling of shallow-water flows. It has its weaknesses and errors, but it is certainly the best basic text in this area that I have yet seen.

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**AEOLIAN GEOMORPHOLOGY: AN INTRODUCTION** by Ian Livingstone and Andrew Warren, Longman, Harlow, 1996. No. of pages: xi+211. Price: £25.99 (pb). ISBN 0-582-08704-X.

Over the past decade, the emerging intellectual maturity of aeolian geomorphology has spawned a rash of research monographs, special volumes and thematic texts that have documented recent advances within the subdiscipline, and stimulated further interaction between researchers from

many contributing disciplines. In contrast to these volumes, in this book Ian Livingstone and Andrew Warren attempt to synthesize both the progress and future challenges of aeolian geomorphology in a form and style appropriate for non-specialists and undergraduates. The result is a refreshingly lucid, timely and concise contribution which makes contemporary understanding of the work of wind on the landscape readily accessible to a wider audience.

The distinctive features of this book are its appealingly clear explanations, attractive layout, integration of coastal and arid-zone aeolian phenomena, and excellent